Effect of the ethylene inhibitor 1-MCP in postharvest chains of mini-Phalaenopsis

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A Research on Obtain Virus Free Plant by Means of Meristem Culture in Lena and Scania Carnation (*Dianthus caryophyllus* L.) Cultivars

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Keywords: Carnation, meristem culture, virus

Abstract

This study was carried out to obtain viruses (Mottle, Vein mottle, Ring spot) free plants to carnation cultivars (Lena, Scania) by means of meristem culture. In the result of experiment carried out *in vitro* conditions, the MS basal medium added 1.0 mg/l of BAP was found to be appropriate for meristem development and shoot formation when 0.2-0.4 mm long meristem tips were cultured. For rooting of shoots, the best results were obtained with MS basal medium containing 1.0 mg/l IBA. It was determine tahat the plants obtained from *in vitro* conditions established and developed in a mixture of two parts chestnut soil+one part sand+one part sheep manure. Plants were inspected by ELISA to identify whether they were infected by viruses. The viruses were completly eliminated testing plants from meristem culture.

The Usability of Sewage Sludge Municipal Solid Waste Compost and Spent Mushroom Compost as Growing Media on the Growth of *Euphorbia Pulcherrima*

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Keywords: *Euphorbia pulcherrima*, growing media, organic wastes, quality parameters

Abstract

The usability of composted sewage sludge, municipal solid waste compost, and spent mushroom compost in different ratios with native peat and perlite as a growing medium for *Euphorbia pulcherrima* were investigated. In the greenhouse experiment, *Euphorbia pulcherrima* were grown in pots containing mixtures of peat and perlite (4:1 v/v). Peat was replaced by organic wastes at the rates of 25 and 50 %. Some physical and chemical properties of the growing media, and horticultural parameters, nutrient elements and heavy metal composition of *Euphorbia Pulcherrima* were determined. The effects of different growing media on plant growth, horticultural parameters and mineral status of *Euphorbia pulcherrima* were found significant. Plant growth was enhanced and several important horticultural parameters, such as dry weight, plant height, leaf number, leaf area bract area and visual performance were improved in plants grown on media containing '1 sewage sludge+3 peat+1 perlite' and '1 spent mushroom compost+3 peat+1 perlite'. Both plant and media analysis showed that 25 % volume of peat was successfully replaced by composted sewage sludge and spent mushroom compost while not diminishing the quality of *Euphorbia pulcherrima*. The mixtures of 25 % composted sewage sludge + peat and perlite was found to be most suitable media based on the physical media parameters. Plant nutrient and heavy metal contents of *Euphorbia pulcherrima* were increased by using composted sewage sludge and municipal solid waste compost, but no detrimental effects were observed on plant growth.

Producing a High Quality *Petunia* Plants Growing under Different Media

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Keywords: media, organic and inorganic acids, peatmoss, peanut shell, *Petunia hybrida* L.

Abstract

Peatmoss plays an important role as pot media for growing the ornamental plants, but because its expensive costs, the economic orientation now is looking forward for an alternative media either mixed with peatmoss or separately used. In addition to using some organic and inorganic acids to enhancement the media properties for improving the growth characters of *Petunia* plants. Results of this study showed that, P/PS media treated by acetic or citric acids representing the highest values of all the studied characters. It means that increasing the amount of P or PS to a media hasn't any noticeable effect as when used the treated P/PS media. The highest values of fresh and dry weights (FW and DW), stem diameter and number of branches per plant were obtained when treated P/PS media by acetic acid. Meanwhile, the highest values of shoot and root lengths and the flower numbers were noticed with the same media but treated by citric acid. There were positively significant correlations between FW, DW, shoot and root lengths, stem diameter and number of branches per plant from one side and pH and easily available water (EAW) from the other and negatively with electrical conductivity (EC) of media mixes. Positive significant correlation coefficients were also observed between the total flower numbers and AW, pH and N and K contents. Contrary, the correlation was negative with EC and P content. This means that increase salts in solution of the media mixes P/PS has a bad effect on the total flowers of *Petunia* plants. In the investigated media mixes irrigated with acidified irrigation water, the growth characters of *Petunia* plants positively correlated with water content at field capacity (FC), wilting point (WP) and EAW, which reflected on the media ability to store water and its ability to supply *Petunia* plants by their water needs for metabolism activities.

The Response of Growth and Development from *In Vitro* Seed Propagation of *Dendrobium* Orchid to Chitosan

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Keywords: chloroplast, dry weight, fresh weight, *in vitro* culture, orchids, plant height

Abstract

Chitosan is a deacethylated derivative of chitin derived from crustacean group. Thus it can be degraded in nature and safe for living organism. It has been shown to promote the growth of various plants. For example, chitosan has been reported to increase the growth rate and early flowering in orchid. The objective of this experiment was to study the effect of chitosan on *in vitro* growth of *Dendrobium* Queen Pink protocorms. Protocorms at the approximately size about 0.3-0.5 cm. were cultured on modified Vacin and Went (VW) medium supplemented with chitosan at the concentrations of 10, 20, 40, 60 mg/L or without chitosan (control). The growths were recorded after cultured for 1 year. The results showed that seedlings grown on VW supplemented with chitosan at all concentrations had higher fresh weight and dry weight when compared to the control. Chitosan at the concentration of 60 mg/L had the highest plant height, root length and leave area compared to other treatments including the control. However there was no statistically difference on number of leaves, roots and new shoots. The effect of chitosan on the number of stoma showed that chitosan at all concentrations increased the number of stomata compared to the control but the number and size of chloroplast was not different.

Determination of Leaf Area and Leaf Number of Calandiva Associated with the Accumulation of Degree-day

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Keywords: Calandiva, degree-day, leaf

Abstract

Calandiva® is an ornamental species which has been outstanding in the pot flower market due to its beauty and colorful inflorescences. The objective of this study was to verify a mathematical procedure which allows the description of leaf growth and number of leaves of the Calandiva® associated with the growing degree day (GDD) accumulation. Two experiments were performed with *Kalanchoe blossfeldiana* cultivars 'Bisset' (Calandiva® Pink) and 'Latin Lover Rio' (Calandiva® Orange). Cuttings were planted and cultivated in a plastic pot (11 cm). The experimental design used was randomized blocks with 4 replicates. Each useful plot was consisted of 3 plants, totalizing 12 plants per evaluation. At each fifteen days period, during 105 days, the leaf area was determined in both experiments. Two models which describe the relation between the leaf growth and the accumulation of GDD in Calandiva® were developed. For the development of these models, cultivating data of the Bisset cultivar were used and the validation was performed using the Latin Lover Rio cultivar. These mathematical models were validated and are likely to be used in Calandiva® to correlate leaf area and number of leaves with growing degree day. The model for the number of leaves and leaf area for Calandiva® shows an RMSE (Root Mean Squared Error) of 0.87 leaves and 281.35 cm^2, respectively.

Determination of Leaf Area of Potted Chraysanthemum Associated with the Accumulation of Degree-day

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Keywords: chrysanthemum, degree-day, leaf area

Abstract

Chrysanthemum is very important in flower market due to its characteristics as well as its diversity in format, color and size of inflorescences, besides its fast growing cycle. In order to define and characterize the productive process, this study aimed to determine mathematical models to describe Rage chrysanthemum (*Dendranthema grandiflora* (Ramat) Tzvelev) cultivar leaf development using growing degree-days accumulation. Twelve trials were carried out from May 2007 to July 2008, when cuttings were planted and cultivated in plastic pots (14 cm) containing substrate and receiving fertigation. Experimental design was randomized blocks with 5 replications. Each useful parcel was composed of 3 plants per pot, totalizing 15 plants per evaluation. Every week, leaf number and leaf area were evaluated, totalizing ten evaluations. Four mathematical models, that describe the relation between leaf growth and GDD accumulation in chrysanthemum cultivar Rage cultivated in greenhouse without climatic control, were developed. The mathematical models were validated and are likely to be used in chrysanthemum to relate leaf area and growing degree-days. The models showed RMSE of 88.0 cm^2 (summer); 29.44 cm^2 (fall); 55.61 cm^2 (winter) and 80.01 cm^2 (spring).

Manure Influence on the Post-harvest Durability of Roses in the Integrated Production System

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Keywords: postharvest, roses, production system

Abstract

The efficiency during the productive process of cut flowers is essential to increase the durability after the harvest. The management of the fertilization may influence the vase life of the cut flowers. Based on that, this work aimed to evaluate the post-harvest durability of the roses cultivated in 4 percentages of chemical fertilization (25%, 50%, 75% and 100%) versus presence and absence of green manure (*Calopogonium mucunoides*) cultivated intercropping with the rose plant. The experiment was established in the Plant Science laboratory of the Nucleo Tecnológico Epamig Floricultura in São João del Rei, MG (Brazil). Rose stems of the 'Carolla' cultivar were harvested, conditioned in plastic containers with distilled water and kept in room temperature (22 to 25°C). The experimental design used was completely randomized with eight treatments, four replications and three floral stems per plot. The evaluations were carried out every two days. It was noticed that the stems cultivated intercropping with the green manure presented greater loss of fresh mass during the evaluation (6.47g) when compared to the plants cultivated without the green manure (4.21g). No significant difference was noticed between the stems for the variable vase life. The flower opening was influenced only by the time after the harvest. The evaluated stems presented excellent quality. The petals opening were observed by the increase of the diameter of the floral bud. On the first day of evaluation of the experiment, the buds presented average diameter of 29.82 cm and in the last evaluation 66.78 cm. The intercropping of the rose plant with the evaluated green manure damaged the post-harvest quality of the roses steam which were shown less turgid.

Sustainable Management of the Soil in the Integrated Production of Roses

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Keywords: Floriculture, chemical fertilizer, bio-fertilizer, green manure, cut flower, bokashi, supermagro

Abstract

The Integrated Production System consists in the agricultural exploitation for the production by use of the natural resources and of regulating mechanisms to minimize the use of inputs and contaminants ensuring the sustainability. This work aimed to evaluate the production of roses of the 'Carolla' cultivar cultivated in different soil managements in the Integrated Production System. Rose cuttings were cultivated in soil in the greenhouse. The experimental design used was of randomized blocks, with split plot in the space, with eight treatments and four replications. The treatments were constituted of four percentages of chemical fertilization recommended to Minas Gerais, Brazil (25%, 50%, 75% and 100%) versus presence and absence of green manure (*Calopogonium mucunoides*) cultivated in intercropping with the rose plant. The treatments which did not receive 100% of chemical fertilization were incremented with 2 types of biofertilizers applied monthly: Bokashi (16 g/plant, at soil) and Supermagro (5% at leaves). The evaluations were carried out 3 times per week in the period of one year. It was noticed that in the presence of the green manure, the number of stems produced per plant (7.16), dry matter of the leaves (4.55g) and total dry matter (12.06g) were lower when compared with the same variables evaluated in the plants cultivated without the green manure (7.98; 5.01g and 12.90g, respectively). For the remaining evaluated parameters (stem and floral bud length; diameter of the stem base and of the floral bud; dry matter of the stem, and of the floral bud) no significant difference occurred. In the first year of evaluation it was verified that it is possible to produce quality roses when lower percentages of mineral fertilizers are used, because the production and the quality of the plants were similar even with reduced fertilization.

Integrated Production of Roses: Influence of the Soil Management in the Occurrence of Pests and Natural Enemies

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Keywords: integrated production, *Rosa* sp., soil management

Abstract

The integrated production proposes the adoption of adequate practices in the use of agrochemicals and concerned with the sustainability of the agroecosystem. Pest control is one of the challenges faced by producers of roses, because the chemicals are harmful to the environment and are not always efficient. The fertilizer management can influence the incidence of pests. This study aimed to evaluate the influence of the soil management over the occurrence of pests and natural enemies in the cultivation of the rose plants under the Integrated Production System. The experiment was carried out at the Agricultural Research Enterprise of the State of Minas Gerais, Brazil. Rose cuttings of the 'Carolla' cultivar were used. The design was in randomized blocks with 8 treatments constituted of 4 percentages of chemical fertilization recommended for the rose plant in Minas Gerais, Brazil (25%, 50%, 75% and 100%) versus presence and absence of combination with green fertilizer (*Calopogonium mucunoides*) and four replications each. The samplings of the phytophagous arthropods and natural enemies were made weekly from February to November, 2010, in three leaflets/plant in four plants/treatment, chosen randomly. The occurrence of mites (*Tetranychus urticae*), aphids (*Macrosiphum rosae* e *Macrosiphum euphorbiae*), whitefly (*Bemisia* sp.), coleoptera (*Diabrotica speciosa*), parasitoids (*Praon* sp., *Pimpla croceiventris*) and predators (*Chrysoperla externa*, *Cycloneda sanguinea*, *Hippodamia convergens*, *Hyaliodes beckeri*, *Toxomerus* sp.) was observed. In the area without the presence of the green manure were observed a greater number of mites (5.1-7.2±0.06 mites/leaflet) and aphids (2.2-2.6±0.06 aphids/leaflet), compared with the area with green manure (1.1-1.3±0.06 aphids/leaflet and 3.3-4.8±0.06 mites/leaflet). In all of the treatments, floral buds of high quality with long stems (average length of 50-100 cm) were obtained. These results demonstrate that it is possible to conduct the rose plantation in a sustainable way, without excess of application of fertilizers and agrochemicals.

Effect of Manure on the Incidence of Diseases in Rose Plants Cultivated in the Integrated Production System

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Keywords: disease, production system, *Rosa* sp.

Abstract

The deficiency, excess or imbalance in the combination of the nutritional elements can influence the reaction of the plants to the infection from pathogens. The rose plant is susceptible to various pathogens. Therefore, in the production of roses, the application of chemical defensives is carried out in a preventive and intense way, which causes environmental contaminations. This work aims to evaluate the management of the chemical and organic manure based on the incidence and severity of downy mildew and powdery mildew in rose plants cultivated in integrated production system. The experiment was carried out in a greenhouse with cultivation of roses of the 'Carolla' cultivar. The experimental design used was of randomized blocks, with split plot in the space, with eight treatments and four replications. The treatments were constituted of four percentages of chemical fertilization recommend in Minas Gerais, Brazil (25%, 50%, 75% and 100%) versus presence and absence of green manure (*Calopogonium mucunoides*) planted intercropping with the rose plant. The treatments which did not receive 100% of chemical fertilization were incremented with 2 types of biofertilizers applied monthly Bokashi (16 g/plant, at soil), and Supermagro (5% applied at leaves). The samples were taken weekly in the leaflets of the central leaves of the productive branch of the plant for evaluation of downy mildew and powdery mildew. In the integrated management of diseases, preventive applications with alternative products and biological defensives: oil of neem (*Azadirachta indica*), sodium bicarbonate, bordeaux mixture, *Equisetum* ssp infusion, crude milk, silicon and biofertilizers were used. The alternative defensives were efficient. However, despite the reduction of the frequency of applications, the spraying with chemical defensives was necessary. None of the treatments related to the chemical and organic manure influenced the incidence and severity of the downy mildew and the powdery mildew.

Comparative Analysis of Conventional Farming System with Precision Farming System in Marigold (*Tagetes erecta* L.)

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Keywords: bio stimulants, drip fertigation, flower yield, growth, marigold, WSF, xanthophyll

Abstract

An investigation was carried out in African marigold (*Tagetes erecta* L.) hybrid 'L3' at the Botanic Gardens, Department of Floriculture and Landscaping, Horticultural College and Research Institute of Tamil Nadu Agricultural University, Coimbatore, during two seasons (April-July and November-February) during 2009-2010. The study aimed at comparing precision farming system of marigold with conventional farming system. In precision farming system, 75% TRD (Total Recommended Dose) was combined with three biostimulants *viz.*, panchagavya 3%, humic acid0.2% and sea weed extract 0.25%. Conventional system (Farmer's practice) was taken as control. During the two seasons, among the treatments compared, application of 75% RDF (Recommended Dose of Fertilizers) along with humic acid 0.2% recorded the maximum plant height (34.27 and 32.86cm at 30 DAT), (67.41 and 64.88cm at 45 DAT) and (84.19 and 80.12cm at 60 DAT), number of branches (8.79 and 8.17 at 30 DAT), (17.41 and 17.53 at 45 DAT) and (19.71 and 19.75 at 60 DAT), dry matter production (41.61 and 40.35g at 30 DAT), (51.52 and 50.52 at 45 DAT) and (62.42 and 61.42 at 60 DAT), number of flowers (60.26 and 62.29), individual flower weight (17.36 and 16.47g), flower yield per plant (1.02 and 1.05 kg), flower yield per hectare (52.02 and 51.45 tonnes) and xanthophyll content (1.69 and 1.66 per kg) during first and second season respectively.

The Ability of Flower Farmers in Da Lat to Meet the Needs of Downstream Buyers

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Keywords: buyers, flower, farmer

Abstract

The purpose of the study was to explore the gaps between what cut flower growers in Da Lat, Viet Nam, were able to deliver to their downstream customers and what their downstream customers actually wanted. Identifying and rectifying these gaps offers a means of improving the performance of the supply chain and of offering superior value to all actors in the value chain. In this study, 206 farmers, 41 traders, 41 wholesalers and 42 retailers in Da Lat were interviewed. The major gaps in the farmers quality offer were identified. Results suggest that farmers need to improve the quality of the cut flowers offered for sale and their ability to deliver in sufficient quantities when required.

Storage Temperature Affects Quality of Export *Dendrobium* Cut-flowers

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Keywords: chilling injury, flower abscission, orchid, transportation temperature, vase life

Abstract

The export of *Dendrobium* cut-flowers from Thailand to overseas markets has been done by air shipment. Air shipment is the quickest possible delivery but it confronts with high cost of air freight and limited cargo space. The alternative of possible method of shipment to deliver *Dendrobium* cut-flowers to markets in Asia is under considered. Shipment by sea is a novel practice that should be considerably interested for a long-term transportation. We investigated the effect of storage temperature during 3-day shipment of *Dendrobium* cut-flowers. Cut inflorescences of four *Dendrobium* cultivars namely Sonia 17, Anna, Sanan White and Fatima were packed wet under simulated shipment for export and stored at 10, 15 and 20°C for 3 days. The storage temperature at 10ºC induced chilly injury of bud abscission in all four *Dendrobium* cultivars but it had no effect on open flowers. The optimal storage temperature of each cultivar was different. Temperature of 15ºC was optimum for 'Anna', while temperature of 15 and 20ºC were optimum for 'Sonia 17', 'Khoa Sanan' and 'Fatima'. Three days of sea shipment of cut *Dendroubium* flowers for markets in Asia may be possible with the ideal storage temperature during transportation at 15ºC. The customers will have chance to use cut flowers about 15 days.

Effect of Silver Thiosulfate Complex (STS) in Combination with Sucrose on the Postharvest Fragrance of Cut Sweet Pea Flowers

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Keywords: aroma, emission, SPME, sweet pea, STS, sucrose

Abstract

Sweet pea (*Lathyrus odoratus* L.) is a desirable cut flower because of its wide range of colors and exceptional fragrance. However, cut flowers of sweet pea have short longevity, and so antisenescence preservatives such as silver thiosulfate complex (STS) have to be used immediately after cutting. It has been reported that treatment with STS in combination with sucrose is more effective to improve postharvest life than that with either STS or sucrose alone. In this study, we investigated the effects of STS alone and STS followed by sucrose treatment on the fragrance of cut sweet pea flowers. Flower of sweet pea 'Sweet pink' were cut and divided to control and STS treatment groups. STS treatment group was subjected to 1000-fold diluted STS solution for 1 hour. Then STS treated group was divided to 2 groups. One group was treated with 4% sucrose solution for the remainders of experiment, and another STS treatment group and the control was treated with water alone. Exogenous aroma compounds of 3 cut flowers (9 florets) from the control, STS and STS followed by sucrose were analyzed by SPME method, and identified and quantified by GC-MS. Aroma compounds were recovered at 12:00 from the next day after cutting for 5 days in order to determine the daily pattern of emissions. Twenty one major aroma compounds were detected in the all treatments. β-*trans*-ocimene, linalool and *trans*-geraniol were significantly emitted. Emissions from the STS treatments were greater than from the control, but were much less than from STS followed by sucrose treatment. These results reveal that STS treatment alone had only a small effect on the emission of aroma compounds from the flower of sweet pea, but that STS followed by sucrose treatment greatly promoted the emission of aroma compounds.

Effect of the Ethylene Inhibitor 1-MCP in Postharvest Chains of Mini-*Phalaenopsis*

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Keywords: LED bud drop, flower senescence, orchids, transportation, quality

Abstract

***Phalaenopsis* is an important ornamental plant in many countries in Europe and Asia. In Denmark more than 8 million plants were produced in 2009 of which 60-70% was mini-*Phalaenopsis*. The majority of the plants produced in Denmark are exported to other countries in Europe. Hence, the plants are subjected to long periods of transportation, typically ranging from 8-20 hours in trucks. Furthermore, it might take up to 3 days in total before the orchids reach their final destinations. The gaseous plant hormone ethylene is an important factor affecting ornamental plant quality as it accelerates senescence and causes abscission of buds and flowers. During the transportation period, plants are often subjected to several ethylene sources e.g. ripening fruits. *Phalaenopsis* is very sensitive to even low concentration (0.1 µL/L) of ethylene and the producers are not always aware of the goods transported alongside the orchids leading to loss of quality. In an attempt to mimic the effects of ethylene during transportation of mini-*Phalaenopsis* the two varieties SOGO 'Allen' and 'Venice' were subjected to the following combinations of 0.1 µL/L ethylene (E) and 0.5 nL/L 1-MCP (M) for 7 days: [+E, +M same time], [+E, -M], [-E, +M], [-E, -M], [+E, +M applied 2h before] and [+E, +M applied 24h after] in sealed chambers. Ethylene treatment resulted in 100% wilted flower buds in both cultivars. In comparison, the treatment [+E, +M applied 24h after start] resulted in a significantly lower percentage of wilted buds, 7% and 18% for 'Allen' and 'Venice', respectively. Furthermore, for 'Allen', the majority of the flower buds did not wilt and did not shift color compared to the [+E, +M] treatment. Collectively, these data indicated that a postharvest treatment of 0.5 nL/L 1-MCP significantly can inhibit quality losses of mini-*Phalaenopsis,* which have been subjected to low amounts of ethylene.**

Relationship between Electrolyte Leakage and Vase Life of Cut *Anthurium* Flowers cv. 'Fire' and 'Midori'

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Keywords: Anthurium, electrolyte leakage, vase life

Abstract

Relationship between electrolyte leakage and vase life of cut *Anthurium* flowers CV. 'Fire' and 'Midori' was investigated. Electrolyte leakage of both the cut *Anthurium* flowers increased during the vase period at 21 ± 2 °C. It was revealed that 'Fire' flowers had higher increasing rate in percentage of electrolyte leakage than 'Midori' flowers. By means of Least Squares Method, however, its change could be described with the same pattern by one mathematical model. It was found that the maximum value of electrolyte leakage of both cultivars was 167.342 ± 9.251 %. Besides, the change of electrolyte leakage was closely related to the vase life of flowers. Therefore, this model could predict the vase life of cut *Anthurium* flowers cv. 'Fire' and 'Midori' more accurately in which the coefficient of determinations (R^2) were 0.974 and 0.995, respectively.

Effects of 1-Methylcycloprepene (1-MCP) and Modified Atmosphere Packaging (MAP) Treatments during Transportation on the Quality of Potted Impatiens (*Impatiens walleriana*)

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Keywords: *Impatiens walleriana*, floret longevity, MAP, 1-MCP, transportation

Abstract

Ethylene-induced petal and flower abscission is a significant problem in potted impatiens during commercial transportation. Abscised flowers reduce visual impact of the potted plant and can increase the incidence of botrytis and other saprophytic pathogens. The aim of this study was to determine the effect of 1-methylcyclopropene (1-MCP), modified atmosphere packaging (MAP) and their combined treatment on the quality of potted impatiens after simulated transportation at 23 °C for 48 h. The results revealed that carbon dioxide ($CO_{2)}$ increased while oxygen (O_2) decreased inside the MAP packages during treatments. Final ethylene concentration was highest in those treated with MAP (0.06 $\mu L \cdot L^{-1}$), lowest concentration was found in MAP combined with 1 $\mu L \cdot L^{-1}$ of 1-MCP treatment (0.02 $\mu L \cdot L^{-1}$). Treatments of MAP combined with 0.1, 1 $\mu L \cdot L^{-1}$ 1-MCP and 1 $\mu L \cdot L^{-1}$ 1-MCP combined with ethylene delayed flower abscission and increased plant and floret longevity of potted impatiens cv. 'Rouge' and 'Peach'. MAP combined with 1-MCP treatment significantly retarded decreasing of SPAD values in leaves in cv. 'Purple Stripe' and 'Peach' on 4 days after treatments. The results clearly indicated that MAP combined with 1-MCP treatment during transportation may provide a feasible technique for extending the display life maintaining the quality and aesthetic value of potted impatiens.

Screening Vase Life Heterogeneity of Cut Roses

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Keywords: cut rose quality, drought stress, pre- and postharvest practices, rose longevity, sensitive and robust cultivars, single stem variability

Abstract

During a 10-year period of extensive trialling, the flower longevity of about 50 market relevant cut rose cultivars of European origin, and various market channels have been tested at different seasons, and with different postharvest treatments (optimal and numerous challenging conditions). Investigations have shown that variation within cultivars is often higher than variation between cultivars. The range of heterogeneity seems to be cultivar dependent. The longevity of some cultivars varied from 4 to 33 days (sensitive cultivars), whereas with other cultivars was much less variable, reaching usually about 7 to 20 days. Those cultivars have shown both a quite low variability between different seasons and sources (usually <10%), and also between single roses within bunches. For susceptible cultivars, considerable effects of source were typical as well as considerable bunch heterogeneity (often > 50%). Furthermore, the vase life of such cultivars was often reduced by high occurrence of bent neck, especially after drought stress or when no floral preservatives had been applied. From these observations it is proposed to cluster roses not only into those ones with a short, a medium or a good vase life potential, but also roses which are sensitive or insensitive/robust to different production and handling practices.

Effect of Electrolyzed Acidic Water in Combination with Sucrose on the Vase Life of Cut Rose Flowers

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Keywords: electrolyzed acidic water, rose, sucrose, vase life

Abstract

Cut rose flowers ('Diana') were treated with 1) 100 g L^{-1} sucrose for 10 hr, 2) 300 ml L^{-1} electrolyzed acidic water (EAW) for 2 hr, 3) 300ml L^{-1}EAW for 2 hr followed by 100 g L^{-1} sucrose for 10 hr, and 4) water (control), and the effects of the treatments on vase life were evaluated. Compared to the control, all treatments promoted flower diameter, advanced opening, and extended longevity. Treatment with EAW followed by sucrose was the most effective in promoting floret opening as well as extending longevity. Petal color pigmentation was improved by treatments with sucrose alone or EAW followed by sucrose. Ethylene production seemed to inhibit by all treatments, particularly in the presence of sucrose. These results show that EAW followed by sucrose is more effective than EAW alone in improving the vase life of cut rose flowers.

Vase Life of Selected Florist Greens in Different Holding Solutions with Commercial Preservatives

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Keywords: cut foliage, *Davalia sp.*, *Dracaena sanderiana,* floral arrangement, *Microsorium punctatum* 'Gradiceps', postharvest characteristics

Abstract

Florist greens enhance the beauty of flower arrangements and should have decorative appeal and vaselife that match that of the cut flowers. Flower preservatives are commonly used to extend the vaselife of cutflowers but their effects on cut foliage are less known. This study compared the efficacy of two commercial preservatives, Eurofleur and Cocogro, in prolonging the vase life of cut foliage of *Microsorium punctatum* 'Gradiceps', *Davalia sp.* and *Dracaena sanderiana*. Two concentrations of Eurofleur (5 and 10 mg/l) and Cocogro (10 and 15 mg/l) were tested as holding solutions and compared to tap water as control during ambient storage (23-33°C, 65-88% RH). Responses to preservative treatments varied with cut foliage. In *M. punctatum* 'Gradiceps', the two preservatives had no effect on senescent changes. Eurofleur even promoted senescence, resulting in a shorter vaselife (4.2-4.9 weeks) than that of the control and Cocogro treatments (6.2-8.9 weeks). In *Davalia sp.*, 5 g/l Eurofleur inhibited senescence and improved the vaselife by about 5 days more than that of the control and Cocogro treatments (13.3-14.0 days). In *D. sanderiana*, the two preservatives had no remarkable effect as the cut foliage from all treatments remained visually desirable at the end of the 32-day holding period.

IAA Increases in Anthocyanin Content of Cut Oriental Hybrid Lily Flowers

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Keywords: anthocyanins, cut lilies, IAA, postharvest quality, pulsing solution

Abstract

Effects of the pulsing solution containing different concentrations of IAA on postharvest quality and some related physiological indicators of cut flowers of Oriental hybrid lily were investigated. The application of sucrose and 8-hydroxyquinoline citrate (8-HQ) prolonged vase life of cut flowers, increased their fresh weight and ornamental quality. Addition of lower concentrations of IAA with sucrose and 8-HQ increased anthocyanin content in the petals, but did not significantly affect the vase life, diameter of the opened flowers, chlorophyll content in leaves and other related morphological indicators. It also decreased the content of soluble proteins and induced the accumulation of malondialdehyde (MDA). The application of higher concentrations of IAA reduced the vase life, anthocyanin level in petals and the size of opened flowers. In particular, that with 50 mg/L IAA depressed the increase of fresh weight of cut flowers and absorption of sucrose during the treatment. The higher concentration of IAA, however, increased the content of soluble proteins at the beginning of the postharvest period and depressed MDA accumulatiom in the petals. The results in this study suggest that auxin is not the predominant factor inducing the senescence of cut lilies, but may increase anthocyanin content.

Effect of Different Maturity Stages on Display-life of Cut *Dendrobium* Orchids

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Keywords: cut-orchids, *Dendrobium*, display-life, maturity stages

Abstract

***Dendrobium* orchid inflorescences are the most important cut flower for exports. The experiment was to investigate the vase-life of cut *Dendrobium* Suree White and *Dendrobium* Suree Peach '115' inflorescences at different stages of development. Inflorescences of both cultivars were harvested from Mana Orchid nursery at four different stages of development and were transported to the laboratory at Silpakorn University within one hour. The four different stages were determined as following; stage1 had 25 % open flowers, stage 2 had 40% open flowers, stage 3 had 50% open flowers and stage 4 had 75% open flowers per inflorescence where 40% open stage serves as commercial stage. The stem ends were re-cut to ensure a uniform size before placing in distilled water at 25°C for the evaluation of vase-life. The results showed that cut inflorescences of *Dendrobium* Suree White at different stages of development did not affect its vase-life, while the inflorescences of *Dendrobium* Suree Peach '115' cut at 25% of open florets had a longer vase-life (approximately 10 days) compared with other stages (8, 6 and 5 days respectively).**

Evaluation of Tested Vase Solution Compared to Commercial Vase Solution on Cut *Dendrobium* Hybrids

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Keywords: cut orchids, *Dendrobium*, post harvest, vase life, vase solution

Abstract

Vase solution for cut orchids has been developed by replacing silver nitrate with other chemicals which is safety product for environment. The result from preliminaries experiment showed that vase solution contained 100 mg.L^{-1} aluminum sulfate, 200 mg.L^{-1} 8-hydroxyquinoline sulfate and 1.5 % sucrose can extend vase life of three different cut *Dendrobium* hybrids when compared with distilled water. This experiment was aimed to evaluate the quality of our vase solution compared with the commercial vase solution (Chrysal, Naarden, The Netherlands). Three cut *Dendrobium* hybrids namely *Dendrobium* Kao Sanan, *Dendrobium* Lovely Pink and *Dendrobium* Suree Peach were tested. The results showed that *Dendrobium* Kao Sanan and *Dendrobium* Lovely Pink have longer vase life in the tested vase solution than commercial vase solution while *Dendrobium* Suree Peach has shorter vase life in the tested solution than commercial vase solution. In *Dendrobium* Kao Sanan, *Dendrobium* Lovely Pink and *Dendrobium* Suree Peach vase life were extended to 14.8, 16.9 and 13.0 days respectively in tested vase solution. Whereas, cut *Dendrobium* inflorescences treated with chrysal solution had 13.5, 10.1 and 14.6 days of vase life respectively. However, there was no statistically different of vase life between the tested solution and commercial solution in *Dendrobium* Kao Sanan and *Dendrobium* Suree Peach but statistically different of vase life between the tested solution and commercial solution in *Dendrobium* Lovely Pink. These results suggested that our solution was able to improve quality and extended the vase life of cut *Dendrobium* as well as commercial solution

Effects of 1-MCP on Posthavest Life of Cut *Dendrobium* Burana Jade Inflorescences

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Keywords: cut-orchids, *Dendrobium*, 1-MCP, posthavest life

Abstract

Cut *Dendrobium* Burana Jade inflorescences harvested at a commercial maturity stage from orchid nursery nearby Silpakorn University were transported to our laboratory in the morning by car. Stems end were re-cut under tap-water to eliminate air bubble and given uniformity in peduncles length, then treated for 4 h at 25°C with 1-MCP at the concentrations of 0, 250, 500, 1000, 1500 and 2000 nl/L and then placed in sterile distilled water kept at 25°C to determine the vase life. The results shown that 1-MCP at all concentrations had no effect on vase life of cut *Dendrobium* Burana Jade inflorescences but all 1-MCP treatments delayed buds drop and open florets abscission. In control, buds drop and open florets abscised within 7 and 8 days, respectively, while inflorescences treated with 250 nl/L 1-MCP showed buds drop and flowers abscission within 14 and 11 days respectively. Moreover, 1-MCP at the concentrations of 500-2000 nl/L also was able to prevent flowers and buds abscission during vase life.

The Effect of Homogenates of Different Tulip Organs on the Mycelium Growth of some Formae Speciales of *Fusarium oxysporum*

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Keywords: *Fusarium oxysporum*, mycelium growth, tulip

Abstract

In our study the effect of homogenates of different tulip organs cv. Apeldoorn, bulb scales, leaves, stem, perianth, pistils, stamens and roots was evaluated on the mycelium growth of *Fusarium oxysporum* f. sp. *tulipae* (*Fot*), *Fusarium oxysporum* f. sp. *narcissi* (*Fon*), and *F. oxysporum* f. sp. *callistephi* (*Foc*) on mineral Czapek Dox - Dox-Agar (CzDA) medium. Tulip organs were collected on the beginning of May from field cultivation. Addition of homogenates of bulb scales, leaves, stem, perianth, pistils and stamens to CzDA medium evidently stimulated the mycelium growth of all these pathogens (*Fot*, *Fon* and *Foc*). However, the homogenate of tulip roots at a concentration of 1.0% greatly inhibited the mycelium growth of all these pathogens. Also lower concentrations of tulip roots homogenate (0.1, 0.25, 0.5%) substantially limited the mycelium growth of all pathogens proportionally to used concentration. The metabolic significance of these findings will be discussed in relation to chemical constituents of different tulip organs.

Rapid and Non-destructive Measurement of Nitrogen-status in Ornamental Cuttings by Near-Infrared-Spectroscopy as Part of a Quality Assessment System in Supply Chains of Young Plant Production

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Keywords: near-infrared-spectroscopy, non-destructive measurement, ornamental cuttings, quality assessment, supply chain

Abstract

Role of nitrogen in adventitious root formation of leafy cuttings is discussed extensively for different ornamental species. To date, this knowledge is rarely used for a quality assessment system in supply chains of young plant production. As analysis of growing media or nutrient solution during stock plant cultivation have limited significance and plant analysis e.g. Kjeldahl- or Dumas-N are too time consuming and expensive. In the present study[1], we explored the potential of Near-Infrared-Spectroscopy (NIRS) as fast and non-destructive alternative. Cuttings of *Pelargonium* x *hortorum*, *Pelargonium* x *peltatum* and *Chrysanthemum* x *grandiflorum* from current production of three companies and from stock plants cultivated with different levels of N-supply at Weihenstephan research institute have been used for calibration. NIR-spectra were taken from intact, fresh cuttings using a Zeiss NIR-Diode-Array-Spectrometer fitted with a rotary plate for sample presentation. As reference, four N-fractions (amid-N, nitrate-N, amino-N, protein-N) and total-N were analysed using a modified Kjeldahl procedure. Additionally, sums of extractable N-fractions (enf-N=amid-N+nitrate-N+amino-N) and organic bounded N-fractions (onf-N=amid-N+amino-N+protein-N) were calculated. The dataset was 241 samples in total, thereof 161 were used for calibration and 80 samples build the validation set. Best prediction power was achieved for protein-N with a standard error of prediction (SEP) of 1.98 mg N·g DM^{-1} and a R^2 of 0.89, for total-N (SEP = 2.91 mg N·g DM^{-1}; R^2 = 0.88) and for onf-N (SEP = 2.61 mg N·g DM^{-1}; R^2 = 0.87). Amid-N showed a poorer but acceptable accuracy with SEP = 0.40 mg N·g DM^{-1} and R^2 = 0.70. For nitrate-N, amino-N and enf-N, prediction power was poorest with R^2 between 0.55 and 0.67. Results reveal that protein-N fraction, total-N and sum of organic bounded N-fractions can be predicted by NIRS non-destructively within a few seconds. This makes NIRS a promising tool for quality assessment of ornamental cuttings.

Effects of Abscisic acid and Methyl Jasmonate on Postharvest Quality of Patumma (*Curcuma alismatifolia* × *Curcuma cordata* 'Laddawan')

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Keywords: coma bract, stomata, transpiration, vase life

Abstract

The major problem of cut *Curcuma sp.* is the relatively short postharvest due to the rapid wilting of the coma bracts, thus the objective of this present study was to study the effect of anti-transpirant on postharvest quality of *Curcuma* 'Laddawan' inflorescence. Postharvest quality and display life of the inflorescence of patumma (*Curcuma alismatifolia* × *Curcuma cordata* 'laddawan') were determined at 25º C. The stomata of patumma inflorescence consist of two subsidiary cells that are located beside the guard cells. Stomatal type called 'typical stomata' is the guard cells arranged line of epidermis cells. Applications of 5 and 10 μM abscisic acid (ABA) and methyl jasmonate (MeJA) reduced transpiration rate. But they did not delay loss of fresh weight. Patumma inflorescences held in 5 μM of MeJA solution increased water uptake and transpiration rate as compared to others. Neither ABA nor MeJA prolonged the vase life of inflorescences.

Effect of Food Additives on Quality and Vase Life of *Dendrobium* 'Red Sonia' Inflorescence

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Keywords: bud opening, flower dropping, senescence, vase solution

Abstract

Food additive has been used for inhibiting microbial growth in food industry. Basal stem blockage caused by microorganism hastens flower senescence. The objective of this study was to investigate the effect of food additive on quality and vase life of *Dendrobium* 'Red Sonia'. Inflorescences were put into vase solutions of potassium carbonate at 1.75 and 2.00% or sodium carbonate at 1.50, 1.75 and 2.00%, while distilled water and commercial solution served as the control. They were kept at 25°C under constant light intensity of 10 µmol/m^{2}s. Potassium carbonate and sodium carbonate increased bud opening 20-33%, whereas bud opening of inflorescences placed into distilled water and commercial solution were 53.6-63.3%. The commercial solution also increased fresh weight significantly. Inflorescences placed in distilled water had the longest vase life (19.5 days) due to decreased flower dropping (14.3%). The vase life of inflorescences placed in commercial solution, potassium carbonate and sodium carbonate were 14.5, 9-10 and 6-7 days, respectively.

Evaluation of Some Conventional Biocides and Nano Silver Particles on Vase Life, Water Relation and Microbial Proliferation of Cherry Brandy Rose Vase Solution

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Keywords: aluminum sulphate, calcium hypochlorite, cut flower, hydroxyquinoline citrate, postharvest, sodium hypochlorite

Abstract

Water relation interruption and stress is the major cause of vase life reduction in cut flowers and is mostly due to microorganism proliferation in the vase solution which results in vascular occlusion and solution uptake reduction. In order to study the biocidal effect of Nano Silver particles and some conventional biocides, Cherry Brandy roses were treated in a completely randomized design with: citric acid (at 300, 600 or 900 mg l^{-1}), aluminum sulphate (at 100, 200 or 300 mg l^{-1}), hydroxyquinoline citrate (at 200, 300 or 400 mg l^{-1}), calcium hypochlorite (at 400, 600 or 800 mg l^{-1}), sodium hypochlorite (at 400, 600 or 800 mg l^{-1}), colloid of nano silver particles (1, 2.5 and 5 %), tap water, or sterilized distilled water (control). Nano silver particles treatment resulted in the longest vase life, after which aluminum sulphate and citric acid were placed. Nano silver particles, aluminum sulphate and citric acid were the safest biocides. While, sodium hypochlorite treatment resulted in fresh leaf abscission and calcium hypochlorite treatment caused leaf desiccation. Nano silver particles, hydroxyquinoline citrate and calcium hypochlorite were the most effective treatment in controlling microbial proliferation. In most treatments there was an increase in relative fresh weight until day 5, after which a decrease was observed. Relative fresh weight reduction trend in most treatments was sharp except nano silver particles and aluminum sulphate. According to the observations, aluminum sulphate and nano silver particles treatments had the best effect on relative fresh weight. Results indicate that Cherry Brandy rose vase solution uptake is not influenced significantly by vase solution microbial population. Considering different aspects of biocide application, Nano Silver particles and aluminum sulphate were the best treatment groups respectively.

The Effect of Benzyl Adenine, Nanosilver, 8-Hydroxyquinolin Sulfate and Sucrose on Longevity Improvement and Quality Characteristics of some Dianthus Cultivars

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Keywords: *Dianthus caryophyllus*, benzyl adenine, 8-hydroxyquinolin sulfate, nanosilver, post harvest

Abstract

Dianthus is one of the most important ornamental plants and its cultivation has a long history. It is used as a cut flower and also pot plant. Due to ease of production and reasonable price, it has a precious position, economically. In this study, the effect of Benzyl Adenine, in 3 different concentrations of 25, 50 and 100 mg/l as a short time treatment for 48 hours and nanosilver of 2 different concentrations (2 and 4 ppm), 300 ppm 8-Hydroxyquinolin Sulfate and 3% sucrose as along time treatment on Dianthus cut flower longevity was studied. All the flower containers were kept in average temperature of 20 C, relative humidity of 80% and 14 hours photo period supplied by fluorescent lamp (15µmol/m^2.s). The quality characteristics including vase life, total soluble solid, stem bending rate, electrolyte leakage index, chlorophyll content and solution uptake were properly measured and statistically analyzed. The results showed that the short time treatment of Benzyl Adenine in 100 mg/l plus 4 ppm nanosilver and 3% sucrose totally had the best effect on quality characteristics and longevity of Dianthus cultivars.

Postharvest Physiology and Technology of Potted Ficus for Export

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Keywords: defoliation, physiology, potted ficus, postharvest, technology

Abstract

This experiment studied postharvest physiology and technology of Potted Ficus microcarpa L.f., including effects of different media, storage and transportation conditions in export system on the physiology, to understand defoliation mechanism and effects of different postharvest handling on postharvest quality, and develop effective methods in controlling defoliation. The results showed that the mutuality coefficient between the defoliation rate and cytoplasm membrane permeability, POD and CAT activity, and contents of chlorophyll, MDA, soluble sugar and protein in leaves are all upward of 0.7. The best postharvest system technology for exported potted ficus in this experiment was that selecting suitable medium compound (79% coconut chaff + 20% perlite + 1% water retention agent), irrigating root system with liquid GROW MORE K diluted at 100 times, spraying the foliage with 800ug/L 0.004% brassinolides, and storing and transporting the potted ficus at 10□, which could decrease membrane permeability and malondialdehyde content of leaves, postpone the degradation of penetrative adjustive substance in leaf and the decreases of chlorophyll content and poly-phenols aegis enzyme activity of leaves, improve anti-stress capability during storage and transportation, delay ficus decrepitude, and decrease the defoliation rate after 36 days' simulative storage and transportation. The temperature domestication before and after storage and transportation at 10□ decreased the defoliation rate of potted ficus.

Prototype Development of a Plant-Response Experimental Light-source System with LEDs of Six Peak Wavelengths

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Keywords: LED, light-source system, plant light-response, wavelength range

Abstract

A prototype of a light-source system has been designed and developed to support advanced experiments for plant light-response studies. The light-source system consists of light-emitting diodes (LEDs) of six types: violet, blue, green, orange-yellow, red, and far-red (peak wavelengths: 405, 465, 530, 595, 660, and 735 nm). The light-source system can produce light with different compositions of the six wavelength ranges, and can provide photosynthetic photon flux densities (PPFDs) of 416 µmol m^{-2} s^{-1} for an area of 0.18 m^2 at a distance of 175 mm below the LEDs. This PPFD is sufficient for cultivation experiments with almost all plants that might be grown under artificial light. This paper provides a technical description of the light-source system and the results of quantification tests.

Seed Quality Evaluation of Flower Species Used in Dried Floral Arrangements

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Keywords: colour and shape of inflorescence, health condition, seed vigour and germination

Abstract

The demand for seeds of flower species used in dried floral arrangements has increased in recent years in Croatia, especially among small growers. High quality seed and plant material are extremely important for commercial floriculture. Vigour, germination potential, seed purity, package content adjusted to package certificate in relation to individual species are essential features of flower production. The aim of the paper was to examine seed quality of the flower species traditionally used in dried floral arrangements, available on Croatian market in 2011. The quality was assessed by standard ISTA methods. Nineteen samples of seeds were studied in relation to vigour and germination potential, health condition, emergence rate in containers, time of flowering, length of flowering period, authenticity of certified species, plant height, inflorescence colour, length, height and width, optimal drying stage for inflorescence and fruit. The study was conducted on two samples of species *Amaranthus caudatus*, *Nigella damascene* and *Celosia argentea* var. *cristata,* four samples of species *Helichrysum bracteatum* and *Limonium sinuatum,* one sample of species *Celosia argentea* var. *plumosa,* *Ammobium alatum* and *Gomphrena globosa,* and finally two samples certified as dry flowers of mixed species. The poorest quality feature of all tested seeds was germination, ranging between 0 – 94 %. The commonest disease present was *Alternaria alternata*. All species were correctly certified, except one sample of the species *Celosia argentea* var. *cristata* and *Celosia argentea* var. *plumosa.* The study shows that Croatian flower market should be supplied by a higher quality seeds.

Effects of Flower Preservatives on the Vase Life of Gerbera (*Gerbera jamesonii* H.Bolus) Flowers

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Keywords: cut flower, chemical treatment, gerbera, physical changes, vase life

Abstract

Gerberas are grown for garden decoration and also as cut flowers for interior decoration and for making boquets. These easy to grow , light weight flowers with long (50-70 cms) and slender flower stalk, exquisite petal arrangements with different shades of attractive colours and moderate vase life , all in a combined way renders gerbera flowers to a prominent position amongst the elite group of top ten cut flowers of the international flower markets. Three cultivars of gerbera viz. Dana Ellen, Rosalin and Sun Way were subjected to twelve different treatment combinations, six of which were used as pulse treatment and the rest as holding solution. Pulsing treatment with $AgNo_3$ 1000 ppm + Sucrose 4% + Distilled water showed significant beneficial effect in extending the vase life of all the three cultivars of gerbera. Treatment combination $AgNo_3$ 100 ppm + Sucrose 4% + Distilled water as holding solution was envisaged as the second best in extending the vase life of cut flowers. SunWay registered the maximum vase life followed by Dana Ellen and Rosalin. A strong correlation existed between flower uptake and extension of vase life. Overall, pulsing treatments showed slightly better results on extension of vase life as compared to holding treatments.

Studies on Methods of Dehydration of Rose Buds Gold Medal and Minu Parle

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Keywords: colour retention, dehydration techniques, rose buds, shape, texture

Abstract

Dried rose buds are in considerable demand in the domestic market as well as in the global market. In the eastern parts of India flowers are available in abundance with good form during the winter months. During summer months, flowers are available but not with standard form and the fresh cut flowers also donot stay for long if not sufficient care is provided. Different methods of dehydration were used for production of dried rose buds cv. Gold Medal (Golden yellow) and Minu Parle (Maroon red). Flowers having stalk length of 5 cm were embedded in different media viz. silica gel, white sand, sawdust and combination of sand:boric acid (1:1,v/v), sawdust-boric acid(1:1,v/v) and were dried in open air room condition, hot air oven and microwave oven for different durations. Optimum duration of drying was considered on the basis of colour retention and post drying shape, form and texture which varied greatly due to condition and media. Irrespective of cultivars, moisture loss was recorded 65-66 percent. In both the cultivars, silica gel embedded buds exhibited best performance in respect of early drying, retention of colour, shape and texture of flowers in microwave oven followed by hot air oven. Drying duration did not vary in between the varieties, however, colour retention and overall acceptability was better with cv. Gold Medal. Maximum size reduction was noted with sawdust alone. Post drying longevity studies revealed microwave treated buds embedded in silica gel exhibited longer shelf life than others.